MITIGATING THE VOLATILIZATION ASSOCIATED WITH TELONE

by
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In 1972 this author reported the volatilized amount following a 280 kg/ha shankless, 30 cm deep injection of 1,3-Dichloropropene (1,3-D) in a drying soil to be 2% of the applied. Using shanks the volatilized amount could reach as much as 20% depending on the attention given to filling and compacting of soil behind the delivery shanks (1). Eighty-five percent of the volatilization occurred between day 1 and day 5 with the peak amount on day 3. Excessive volatilization and the subsequent 1990 suspension of 1,3-D use in California prompted the development of new shank delivery designs, maximum treatment rates of 135 kg/ha, and higher soil moisture content at the time of treatment (2). As a consequence, 1,3-D is now permitted for selective use in California. Unfortunately, in old vineyard and orchard sites treatment rates of 400 kg/ha applied to a dried soil are required to kill remnant roots down to 1.5 m depth and provide control of endoparasitic nematodes to 99.5% of the nontreated as much as two years after treatment (3).

There are at least three approaches that may be used to mitigate 1,3-D volatilization at these higher treatment rates. Sealing the field surface with a poly film tarpaulin doubles the treatment cost but also presents special exposure problems during tarpaulin removal. A second approach involves delivery of 1,3-D at 75 cm depth instead of the usual 30-45 cm depth. With shank traces properly filled and compacted there would be less of the 1,3-D and it would not reach the field surface for 48 hr (1). The use of moveable sprinklers utilized intermittently to produce a surface seal between 36 and 120 hr after treatment should be evaluated.

A third approach, and the one we have studied most, involves drenching of the field with 15 cm-ha water containing 366 kg/ha emulsified 1,3-D uniformly injected into it (3). Two years after making such a treatment it is now apparent that each of seven selected tree and vine crops planted 6 mo after treatment has grown comparable to that achieved following shanked methyl bromide or 1,3-D. Control of root lesion nematode, *Pratylenchus vulnus* and citrus nematode, *Tylenchulus semipenetrans*, one year after treatment was 99.5% of the nontreated.

In two separate drench sites we also monitored 1,3-D volatilization. Both sites involved a dripper emitter located at each 30 cm interval across the field, but in one site they laid on the field surface and in the other they were buried 30 cm deep. Unfortunately, the water infiltration rate for this soil was closer to 15 cm in 10 hr rather than the preferred 15 cm in 8 hr or less. Puddling occurred in the buried-emitter site as well as the on-surface site. Two weeks of continuous air monitoring from a point 15 cm above the field surface revealed that two-thirds of the volatilization from the surface drip occurred in the 12 hr period during application. Volatilization from the buried drip was half of that from the surface drip with peak volatilization occurring in the 12 hr period just after application. These data suggest that by drenching 1,3-D one can reduce volatilization as it becomes locked into the soil profile with water. A reusable poly film tarpaulin may need to become a component of the drenching device when broadcast treatments are made in soils with slower water infiltration.

A fourth approach with 1,3-D is now apparent. Emulsified 1,3-D delivered via existing low-volume irrigation systems can provide kill of tree and vine roots before removal of the planting. Minimal 1,3-D volatilization would occur because 1) less 1,3-D would be used per hectare and 2) puddling of water in that area can be kept to a minimum. Strip treatments such as this would only be applicable where resistance to soil pests is also available.

Literature Cited

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